

**W**  **L** 20142758  **ME**  **TO** **AUST**  **N**



CONNECT



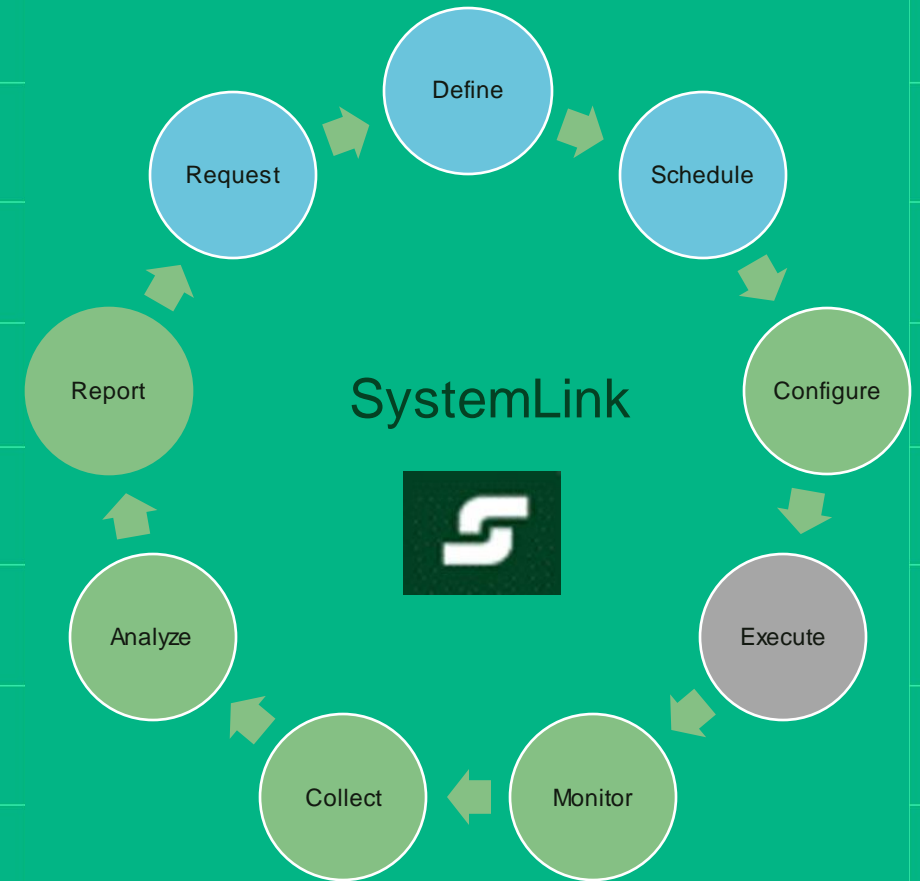
# CONNECT

2023 AUSTIN



# 7 Ways SystemLink can Improve Your Test Operations

Steve Michalec & TJ Giere



# Challenges in Test Operations

- Configuring Test Systems
- Ensuring Latest SW release aligned with Test request
- Low visibility into test equipment utilization, health, traceability
- Difficult to Monitor Test Execution in real-time
- Viewing critical test parameters
- Difficulty in tracking and scheduling incoming test requests
- Managing test request from Maintenance, Calibration

# Introduction

***Steve Michalec***

Offering Manager

NI

[steve.michalec@ni.com](mailto:steve.michalec@ni.com)

***TJ Giere***

Principal Product Owner – SystemLink

NI

[tj.giere@ni.com](mailto:tj.giere@ni.com)

# Agenda

7 Ways SystemLink can  
Improve your Test Operations



- **Introduction**
- **7 Benefits**
- **Q&A**
- **Closing**

# What is SystemLink?

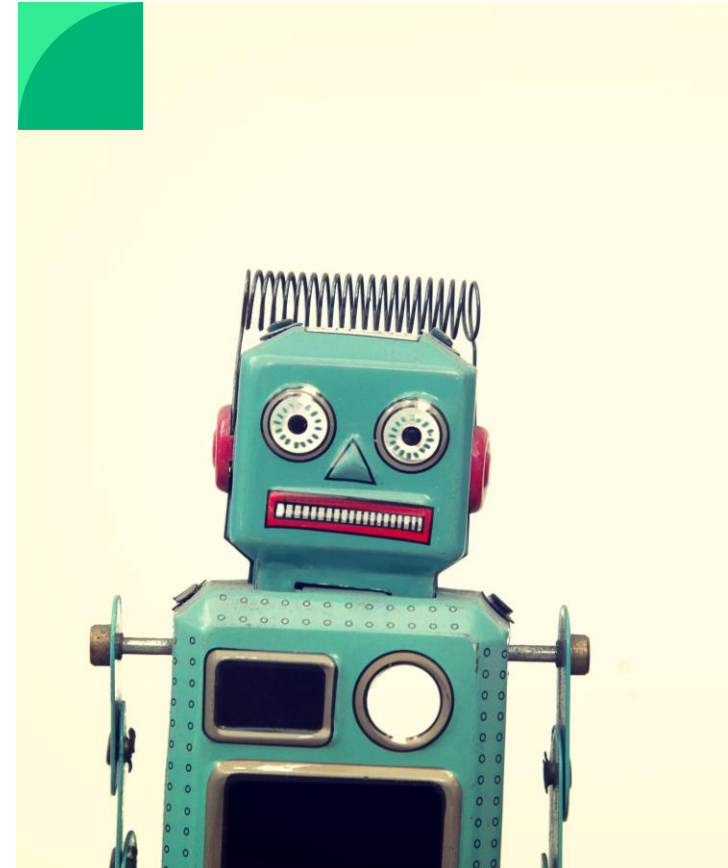
SystemLink is a software platform that helps you manage your test and measurement systems.

With SystemLink, you can deploy software, configure devices, monitor tests, and analyze data from a web-based interface.

SystemLink can help you improve operational efficiency and productivity for your test and measurement applications.

- ChatGPT

Your Future Overlord





# Improve lab efficiency



# Lab Efficiency through Systems and Asset management



Reduce time spent keeping systems up to date



Get notified when your equipment is at risk



Plan maintenance and keep track of your test assets



# Reduce time spent keeping systems up to date

☰ Systems Management
? 👤

Systems

41

systems

7

connected

34

disconnected

20

pending

0

discovered

31

alarms

Test Cells ▾
🔍
↗️

🔍 ( Workspace equals Default AND Property matches Group:Test Cells ) ×

<input type="checkbox"/>	Name ↑		AI 0	AI 1	AI 2	AI 3	Utilization	Test Status	Throug...	Pending status	
	Data Logger 1	●	17.2...	17.0...	1,41...	1,41...		error: {"st...	14		🔔
	Data Logger 2	●	18.2...	18.1...	31.2...	18.7...		error: {"st...	12		🔔
	Data Logger 3	●	16.1...	16.3...	16.8...	16.1...		error: {"st...	4		🔔



# Get notified when your equipment is at risk

☰ Systems Management
?
👤

Systems

41

systems

7

connected

34

disconnected

20

pending

0

discovered

31

alarms

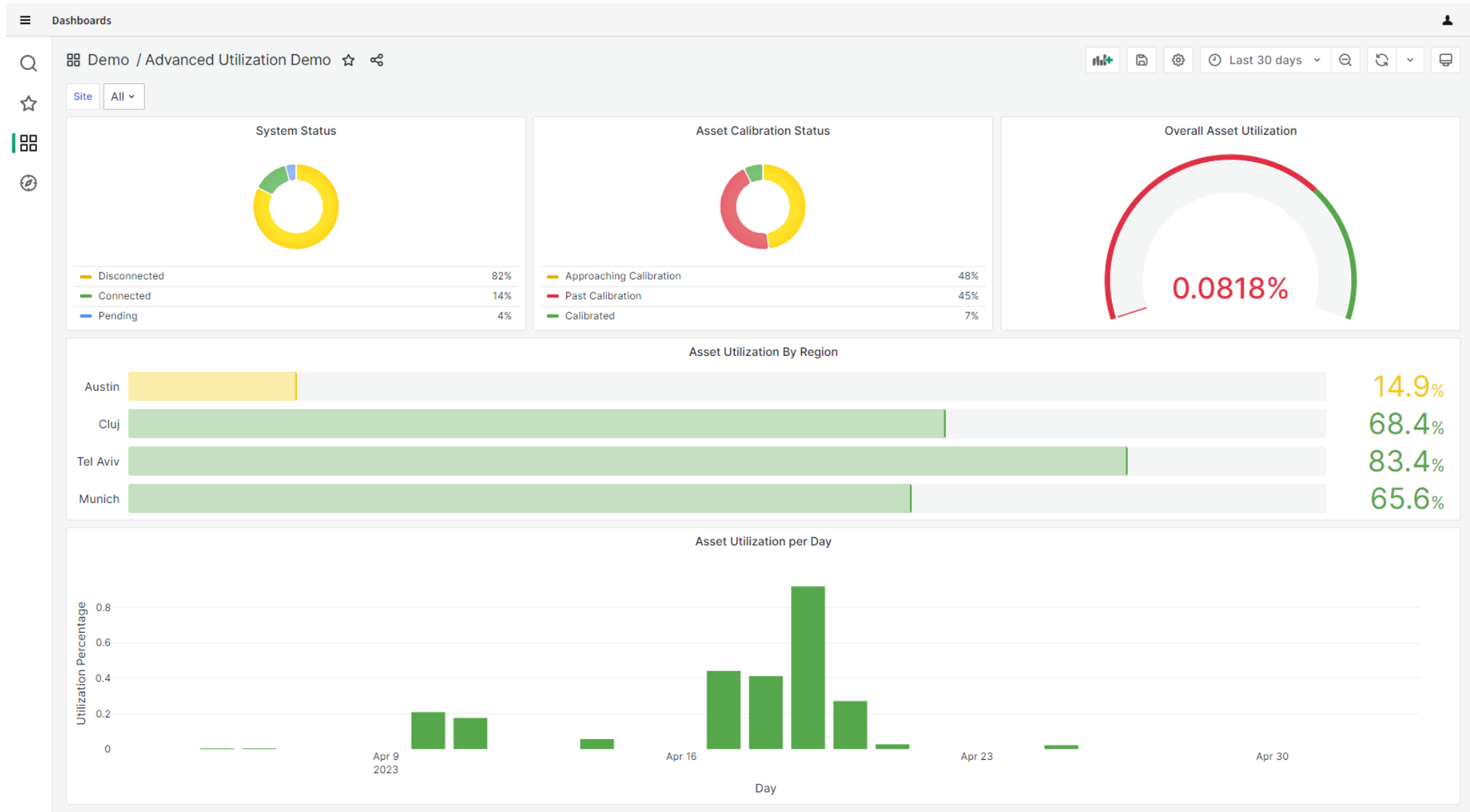
\*Default ▾
🔍
↗️

🔍 ( Connection status equals Connected OR Connection status equals Connected (refresh failed) OR Connection status equals Connected (refresh pending) ) ×

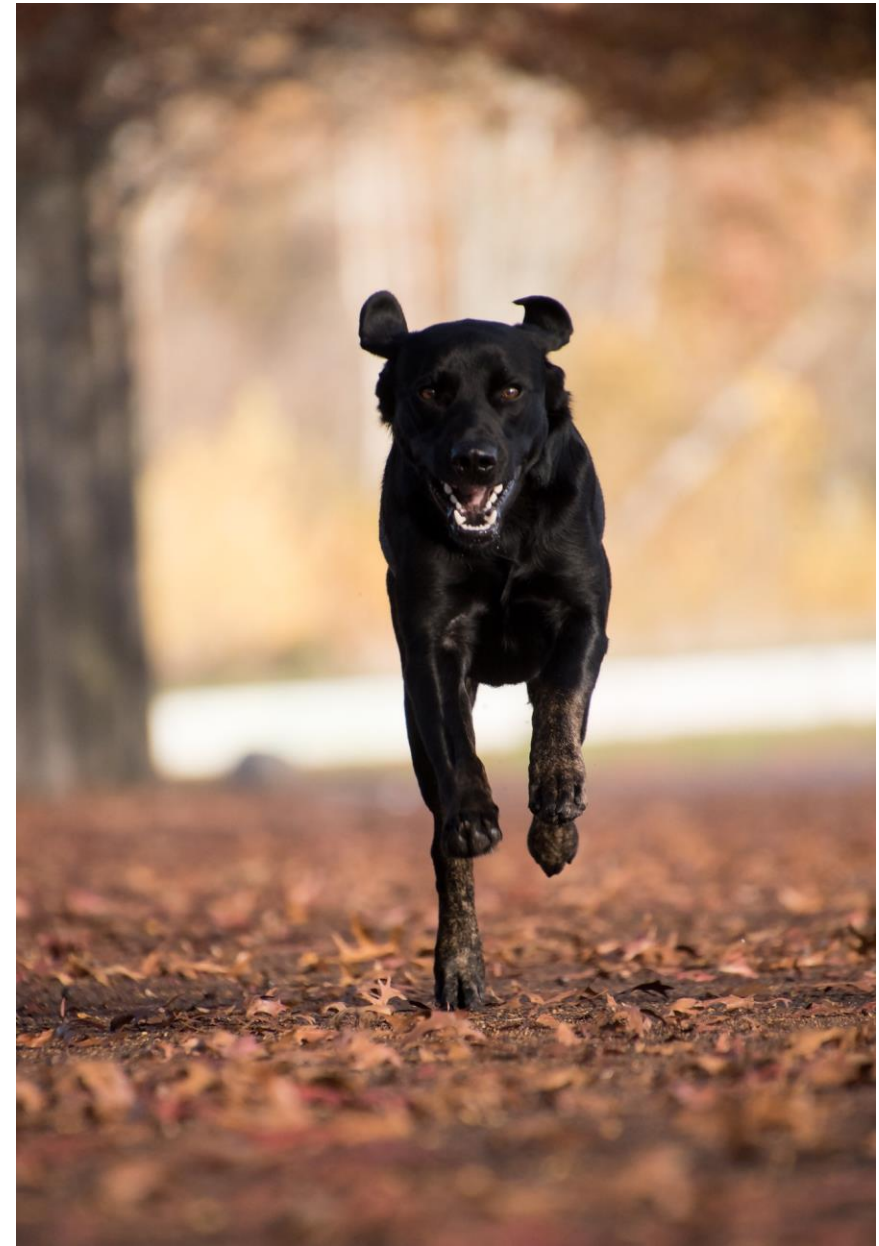
	Name			IP address	Model	Serial number	System start time	Pending status	
^ Test Cells (3)									
	Data Logger 1	🔔	🟢	10.2.136.186	NI cRIO-9042	01E10AB4	May 1, 2023		
	Data Logger 2	🔔	🟢	10.2.136.183	NI cRIO-9042	01E10AB8	May 1, 2023		
	Data Logger 3	🔔	🟢	10.2.136.184	NI cRIO-9042	01E10AC1	May 1, 2023		
^ Desktop Machines (2)									
	Desktop 1	🔔	🟢	10.2.136.185	Precision 3630 Tower	516VCV2	April 30, 2023		
	Desktop 2	🔔	🟢	10.2.136.187	Precision 3630 Tower	518TCV2	April 13, 2023		
^ Empty (2)									
	Measurement SDK Demo - DO NOT MESS	🔔	🟢	10.2.227.16	NI PXIe-8840 Quad-...	030FE886	April 25, 2023		
	BRADT2-LT	🔔	🟢	172.19.224.1	Precision 7520	HHGQNN2	April 27, 2023		



# Plan maintenance and track your test assets



By putting your test systems' health and status information in one place, SystemLink gives you the tools to keep your lab running smoothly.



# Master your data



# Master your data



Harmonize your test data using automated ETL data ingestion



Use built-in visualization tools to navigate your data

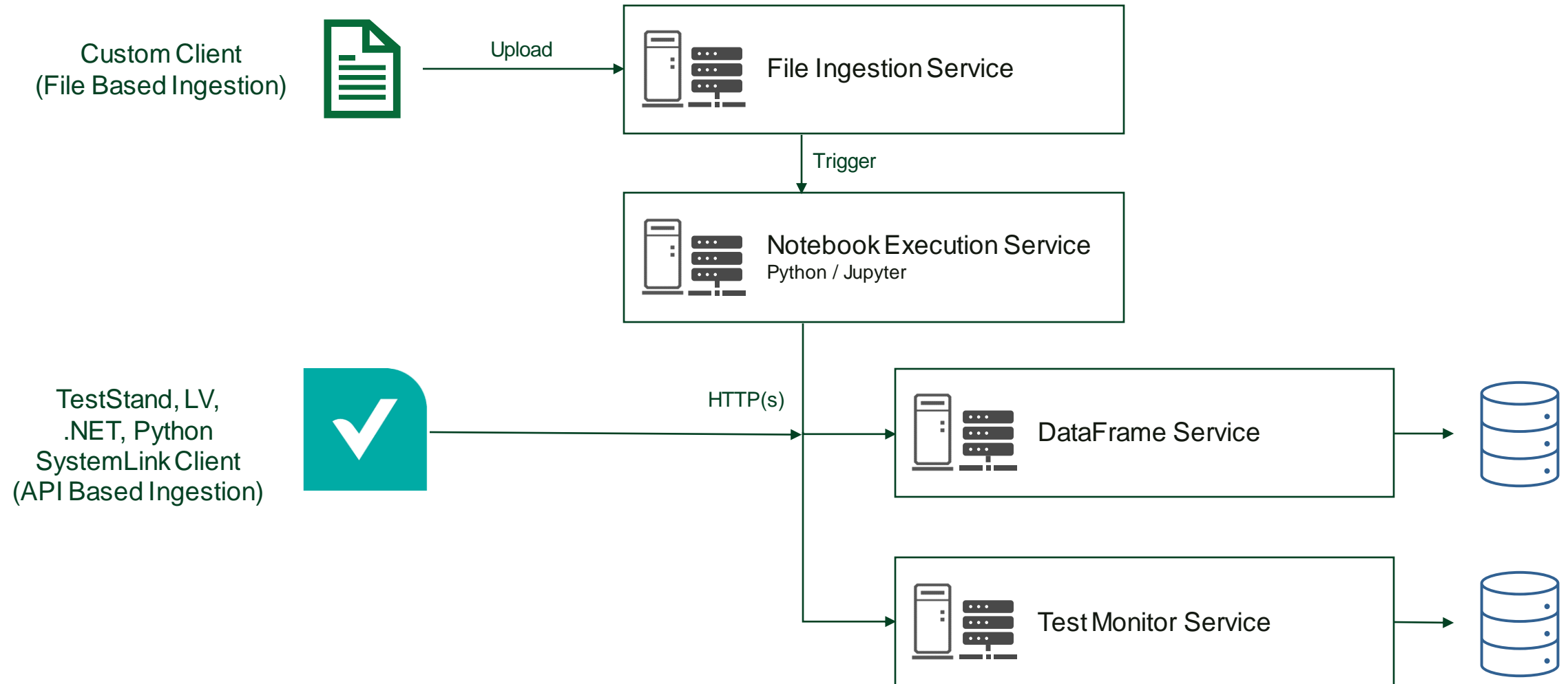


Manage fine-grained control over who can access your data



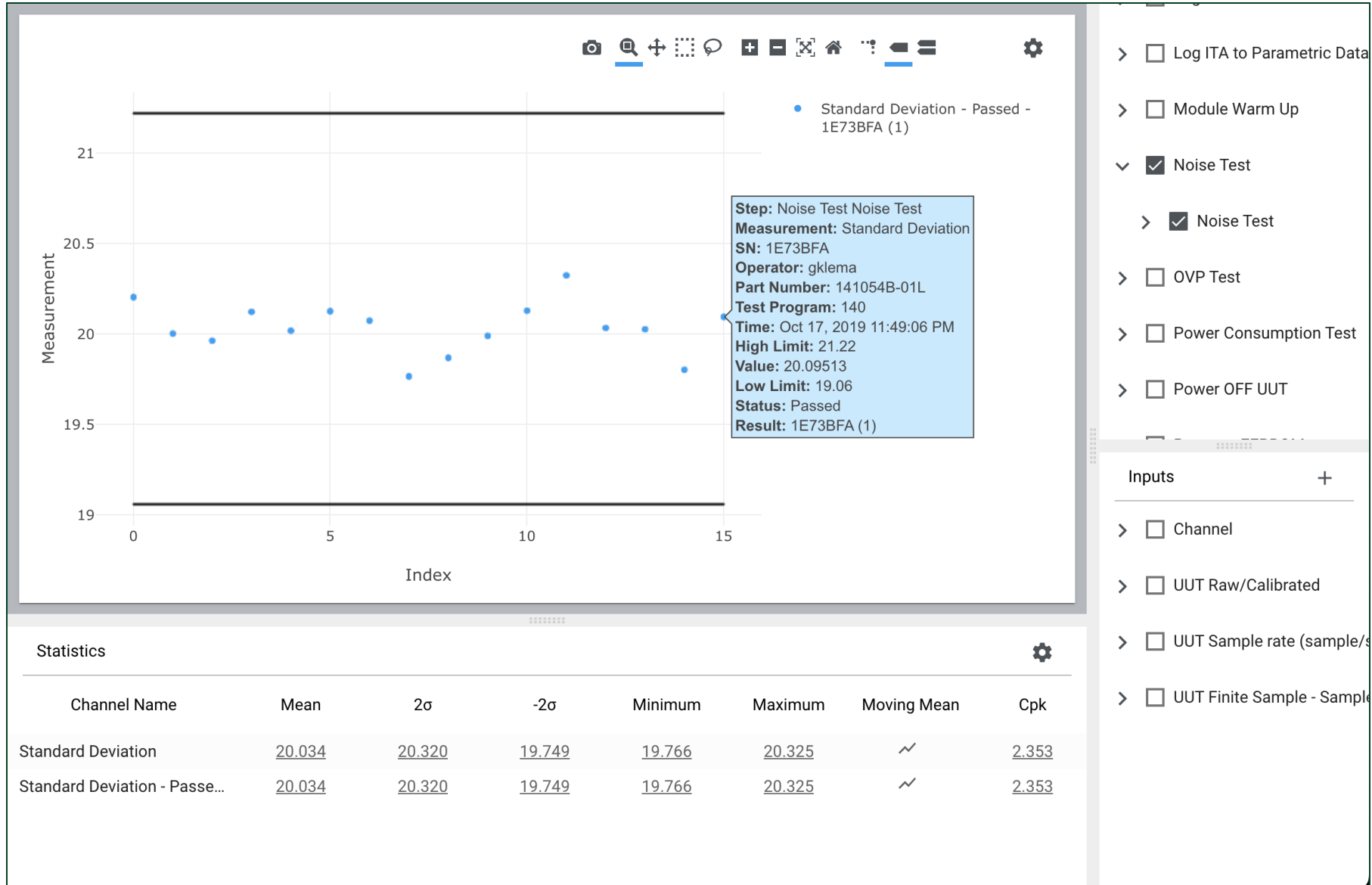


# Harmonize your test data with ETL automation





# Use built-in visualization tools to navigate your data





# Manage who can access your data

### Roles

Name	Type
Automated Agent	service, built-in
BATS Developer	user
Collaborator	user, built-in
Data Maintainer	user, built-in
DataFrameService Admin	user
Design System Developer	user
Routine maintainer	user
Systems Maintainer	user, built-in
Workspace Admin	user
Workspace Owner	user, built-in

### Role Editor

Info Privileges

Applications and services

Test Insights ▾

Privileges

- Allow all privileges
- Access web application
- Create test results and products
- List and view test results and products
- Modify test results and products
- Delete test results and products

CANCEL DELETE UPDATE

By organizing your data in one place with appropriate data models, you can maximize its utility and gain control over how and by whom it is accessed.



---

Keep your stakeholders up to date



# Keep your stakeholders up to date automatically



Simplify report generation using the integrated Jupyter environment and SystemLink HTTP APIs



See metrics at a glance with Grafana dashboards



Automate tasks on an event or a schedule with Routines



# Simplify report generation with Jupyter Notebooks

**Test Insights**


- Systems Management
  - Systems
  - Assets
  - Package Repository
  - States
  - Reports
  - Jobs
- Test Insights**
  - Dashboard
  - Results
  - Products
  - Reports
- > Measurement Data Analysis
- > Custom Applications
- > Utilities
- > Data Administration
- > Access Control

Test Insights > Results (NIMH) > SN: 4325 > Attachment

Download

DIADEM~2-REPORT\_BatteryTest\_TDMS.TDR
1 / 9 | - 97% +

1




Vehicle Program: EV10      Part No: AFX1573329S      Test Name: HPPC Sweep      System ID: TB\_laslo\_new  
 Requestor: Gunnar McCleod      Serial No: 17592256312      System Lab: North BuildA      Smart No: City Summer 3

HPPC Charge Power Tables (kW)


Set Temperature: 32 °C  
Low Volt Setpoint: 13 V

SOC %	0.2 secs	2.0 secs	10.0 secs	20.0 secs	30.0 secs
100					
78	338.319	315.764	278.616	255.259	
47	957.513	913.658	814.212	748.057	
27	1159.03	1106.74	994.572	914.265	
0	1E+30				
100					
83	288.319	265.764	228.616	205.259	
55	907.513	863.658	764.212	698.057	
34	1109.03	1056.74	944.572	864.265	
0					


2




3



4



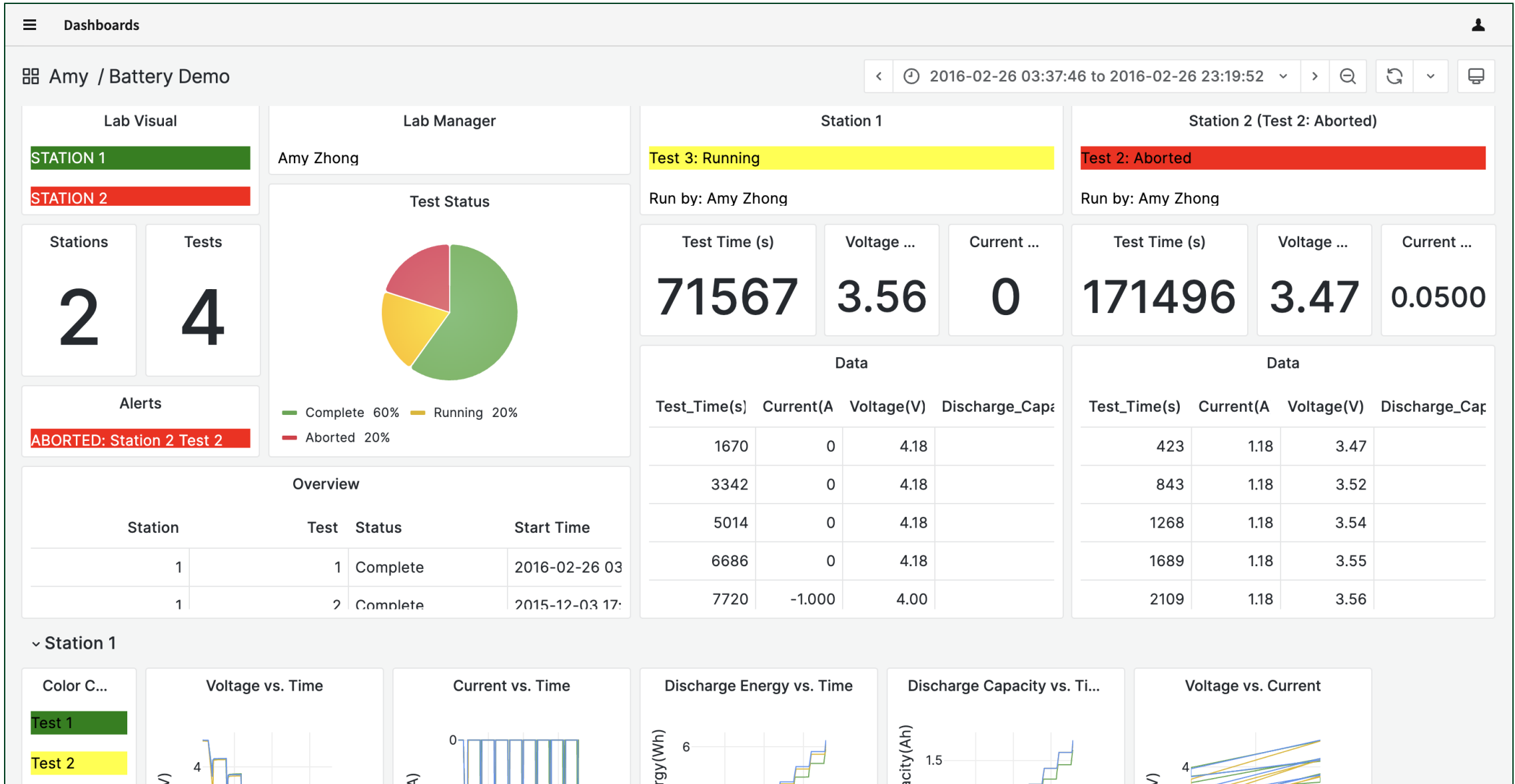
5



Page 1 of 9



# See metrics at a glance with Grafana dashboards







# Automate tasks with Routines

**Routines**

Create routine

Name	Description	Source
Testing trigger...		Files
ERG_ETL		Files
MDF4_ETL		Files

## Create Routine

Name  
Generate Weekly Test Report

Description  
Generate an RTEC PDF Report. Report will be uploaded to SytemLink and a copy will be emailed to Steve.

Workspace: Default | State:  Enabled

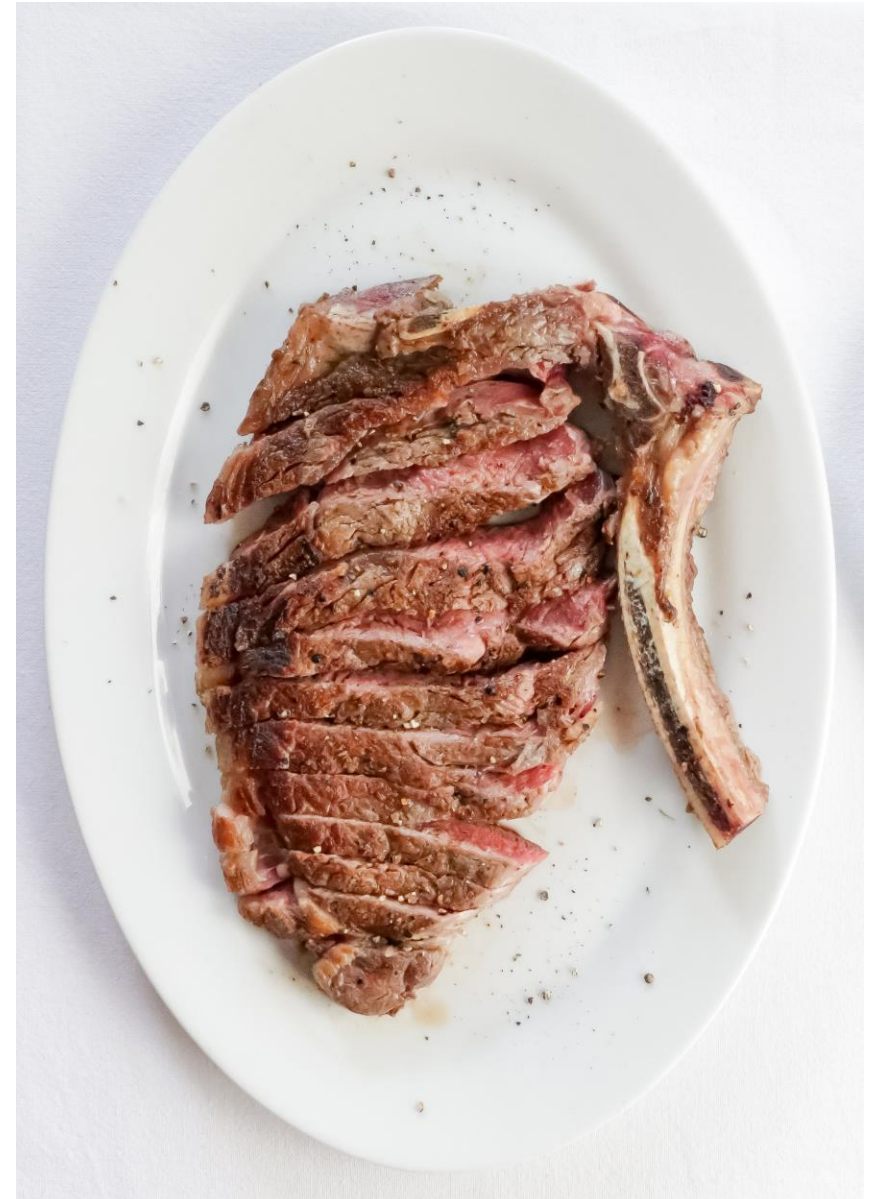
Source: Time

Notebook: RTEC Report.ipynb

Start Date and Time \*: 5/12/2023, 17:00:00  
UTC: 2023-05-12 22:00:00

Repeat: Weekly

Keep your stakeholders informed with the data they need by simplifying report generation.



# Reduce the cost of test



# Reduce the cost of test



Get the most out of your test equipment by tracking under-utilized assets



Reduce cycle time by analyzing execution data trends



Monitor health metrics like power draw to optimize costs and reduce your energy footprint



# Track under-utilized assets

Systems Management



Reports

Update Report | View Assets | Download Source

Report: Asset Utilization

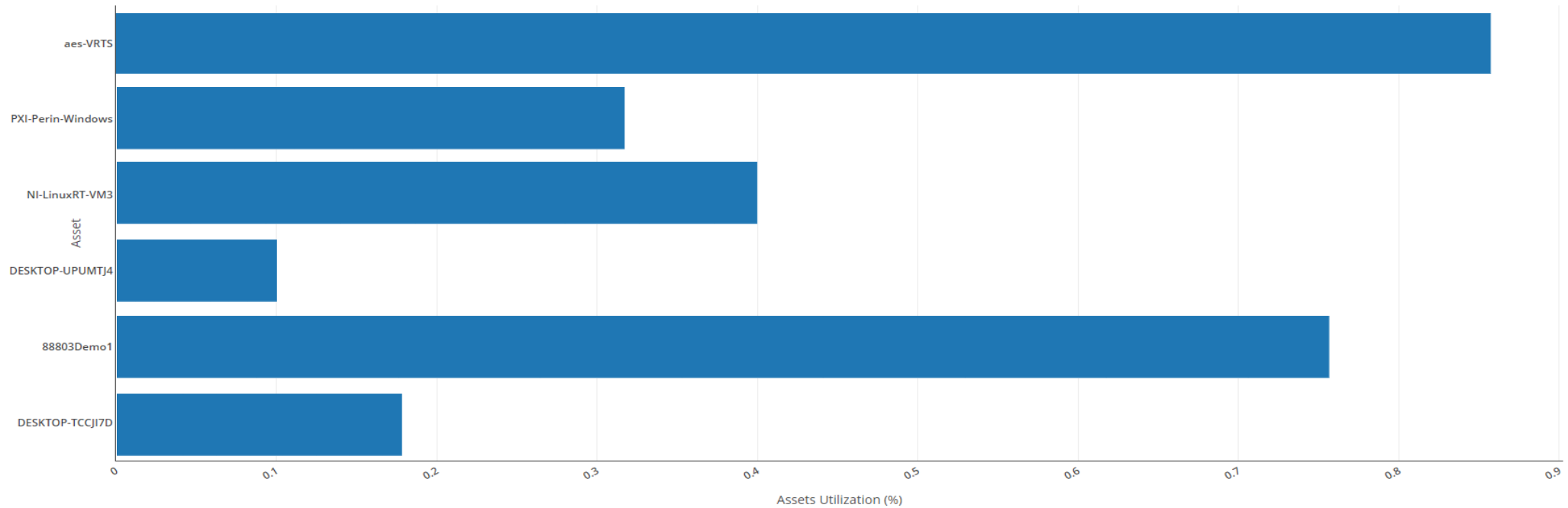
Group by: Asset

Filter: + Property

✕ Model equals NI PXIe-8880

✕ Time Span 365 Days

Asset Utilization (Updated 05/03/2023 10:17:25 CDT)





# Reduce cycle time by analyzing execution data trends

### Test Insights

Test Insights > Reports

Dashboard  
Results  
Products  
Reports

Update Report | View Results | Cancel | Download Source | Export as HTML | Save Report

Report:

Group by:

Query by product:   equals

Query by result:    equals

**Test Times (Updated 5/16/2023, 1:59:22 PM)**

Test Start Time (Month)	Elapsed Time (Approximate)
Jan 2019	30, 55, 58
Feb 2019	32, 35, 38, 40, 42, 45, 48, 50, 52, 55, 58, 60
Mar 2019	48, 50, 52, 55, 58, 60
Apr 2019	48, 50, 52, 55, 58, 60
May 2019	28, 30, 32, 35, 38, 40, 42, 45, 48, 50, 52, 55, 58, 60, 150
Jun 2019	50, 52, 55, 58, 60, 62, 65, 68, 70, 72, 75, 78, 80, 82, 85, 88, 90, 92, 95, 98, 100, 105, 108, 110, 115, 118, 120, 125, 130, 135, 140, 145, 150
Jul 2019	50, 52, 55, 58, 60, 62, 65, 68, 70, 72, 75, 78, 80, 82, 85, 88, 90, 92, 95, 98, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150
Aug 2019	50, 52, 55, 58, 60, 62, 65, 68, 70, 72, 75, 78, 80, 82, 85, 88, 90, 92, 95, 98, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150
Sep 2019	50, 52, 55, 58, 60, 62, 65, 68, 70, 72, 75, 78, 80, 82, 85, 88, 90, 92, 95, 98, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150



## Monitor health metrics, save the world (and some money)

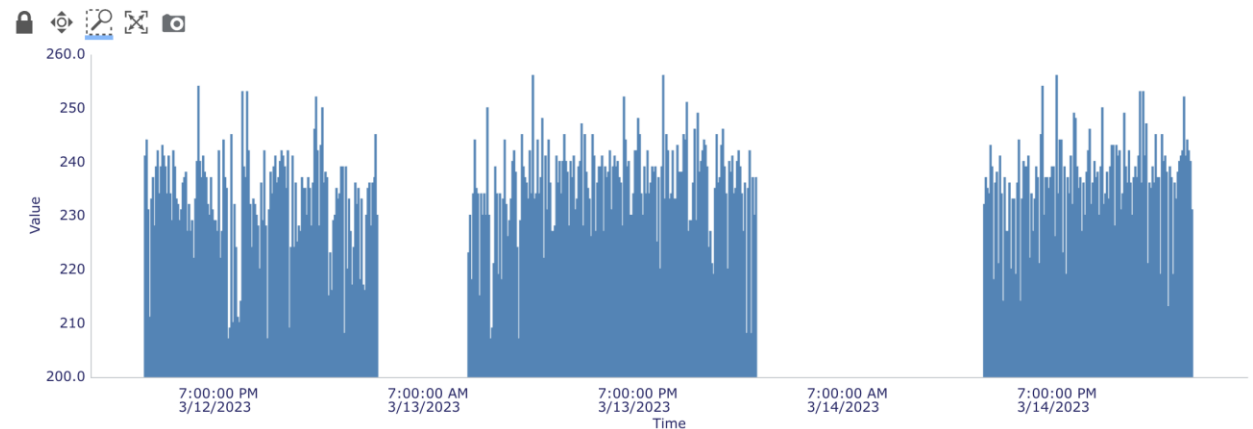
PXI systems are used 40 hrs/week, but are often left powered on for on 168 hrs/week (24/7)

Internal testing shows that typical PXI systems use about 225 watts per hour, even at idle

NI sold ~84K PXI systems last year

In Texas, 1 kWh costs \$0.099

History



Collectively, that comes out to 126,020,045 kWh of electricity globally at a cost of nearly \$12.5M!

Reduce costs by ensuring your test assets are utilized to their fullest and save energy when they aren't needed.





---

# Make data driven decisions



# Make data driven decisions



Drill into your data using interactive, customizable reports



Track measurement compliance from spec to test



# Drill into your data using interactive, customizable reports

Test Insights



Test Insights > Reports



Dashboard

Results

Products

Reports

Generate Report | View Results | Cancel | Download Source | Export as HTML | Save Report

Report: Failure Pareto - Results

Group by: Part Number

Query by product: + Property

Query by result: + Property

X Started Within Custom 30 Day(s)

Generate report to visualize data



# Track measurement compliance from spec to test



Specifications

## Spec Compliance Manager

### Team Edition

Create and Manage Specifications

Upload parametric test data

Automatically compute compliance

Built-in and custom statistics

Custom Reporting

All Products > Example Opamp

View Categories Compliance View 23 Mar 2023, 09:22

Input Parametric

	Health	Coverage	Cpk	Min	Max	Mean
	✓	NA	2.065440582...	4.5647524761...	14.070464891...	9.75
	✗	NA	0.671660439...	-13.00051275...	57.55309894...	11.120689655...
	✗	NA	1.0294117647...	-2.75646620...	36.25632087L...	8.8653846153...
	✓	NA	4883605.166...	2.1790522663...	4.093288553...	3.4e-07
	✓	NA	2.0368714756...	7.61488418138...	13.290301160L...	10.3
	✓	NA	2.11623010459...	9.0843291563...	11.09318831164...	9.999999999...
	✓	NA	2.0610241018...	8.965970500...	10.1575134886...	9.599999999...

### Create Specifications

All Products > Example Opamp

Specifications View READ-ONLY Spec Source: Excel UPDATE SPECS

Input Parametric

Spec ID	Block	Spec Symbol	Spec Name	Vs (V)	Spec Conditions		Spec Limits		Unit
					Temp (°C)	Min	Typical	Max	
Spec_01	-	Vos	Input Offset Vol...	[5]	[25]	-	10	25	µV
Spec_02	-	Vos	Input Offset Vol...	[5]	[-55,25,155]	-	25	60	µV
Spec_03	-	Vos	Input Offset Vol...	[5]	[-25,25,85]	-	10	45	µV
Spec_04	-	enp-p	Input Noise Volt...	[5]	[25]	-	0.35	0.6	Vpp
Spec_05	-	en	Input Noise Volt...	[5]	[25]	-	10.3	18	mV/rtHz
Spec_06	-	en	Input Noise Volt...	[5]	[25]	-	10	13	mV/rtHz

Output Parametric

### Drill Down to Compliance Details

Input Parametric

Vos - Input Offset Voltage

Health: ✗ Fail Coverage: NA Cpk: 0.67166043986578

Min: -13.0005127570655 Max: 57.5530989438452 Mean: 11.120689655172

Standard Deviation: 8.15484713894006

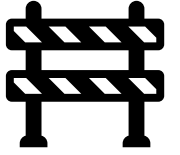
Conditions: Supply Voltage (V) Min Max Mean Cpk Standard Deviation

Use correlated, cross functional data to make informed decisions about your products.



# Track your tests' lifecycle





# Track your tests



Track the status of tests from request through result



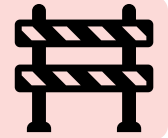
Schedule lab equipment for tests or maintenance



Collaborate with your team to get test done



# Track the status of tests from request through result



### Work Orders

5  
Created by Me

5  
Assigned to Me

15  
All

15  
New

All

Test Requests

Calibration Requests

Maintenance Requests

Create work order ▼

<input type="checkbox"/> Name	Status	Assigned To	
<input type="checkbox"/> Cycle Test G	Defined	Lin Y.	
<input type="checkbox"/> TC81B-07 maintenance	Defined	Bernhard W.	Charlie S.
<input type="checkbox"/> TC01B-01 maintenance	Defined	Bernhard W.	Charlie S.
<input type="checkbox"/> Cycle Test F	Defined	Lin Y.	Miles M.
<input type="checkbox"/> Cycle Test E	Reviewed	Bernhard W.	Miles M.
<input type="checkbox"/> Cycle Test E2	Reviewed	Bernhard W.	Miles M.
<input type="checkbox"/> TC81B-01 calibration	Scheduled	Bernhard W.	Charlie S.
<input type="checkbox"/> Cycle Test E3	Reviewed	Bernhard W.	Adison R.
<input type="checkbox"/> Cycle Test E4	Reviewed	Bernhard W.	Adison R.
<input type="checkbox"/> TC02A-01 calibration	Scheduled	Bernhard W.	Charlie S.
<input type="checkbox"/> Cycle Test D	Scheduled	Lin Y.	Adison R.
Cycle Test C	Scheduled	Lin Y.	Miles M.
Cycle Test B	Scheduled	Bernhard W.	Miles M.
Cycle Test B2	Scheduled	Bernhard W.	Miles M.
Cycle Test A	In Progress	Bernhard W.	Miles M.
<a href="#">TC81B-06 maintenance</a>	Defined	Bernhard W.	Charlie S.
<a href="#">TC81B-06 calibration</a>	Defined	Bernhard W.	Charlie S.

### Create work order

Info

Properties

Name\*  
Enter name

Workspace\*  
Lof ▼

Requested by  
Enter user ▼

Assigned to  
Enter user ▼

Type\*  
Test Request ▼

Earliest start date  
MM/DD/YY 📅

Due date  
MM/DD/YY 📅

Description

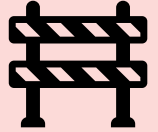
Placeholder

Cancel
Create





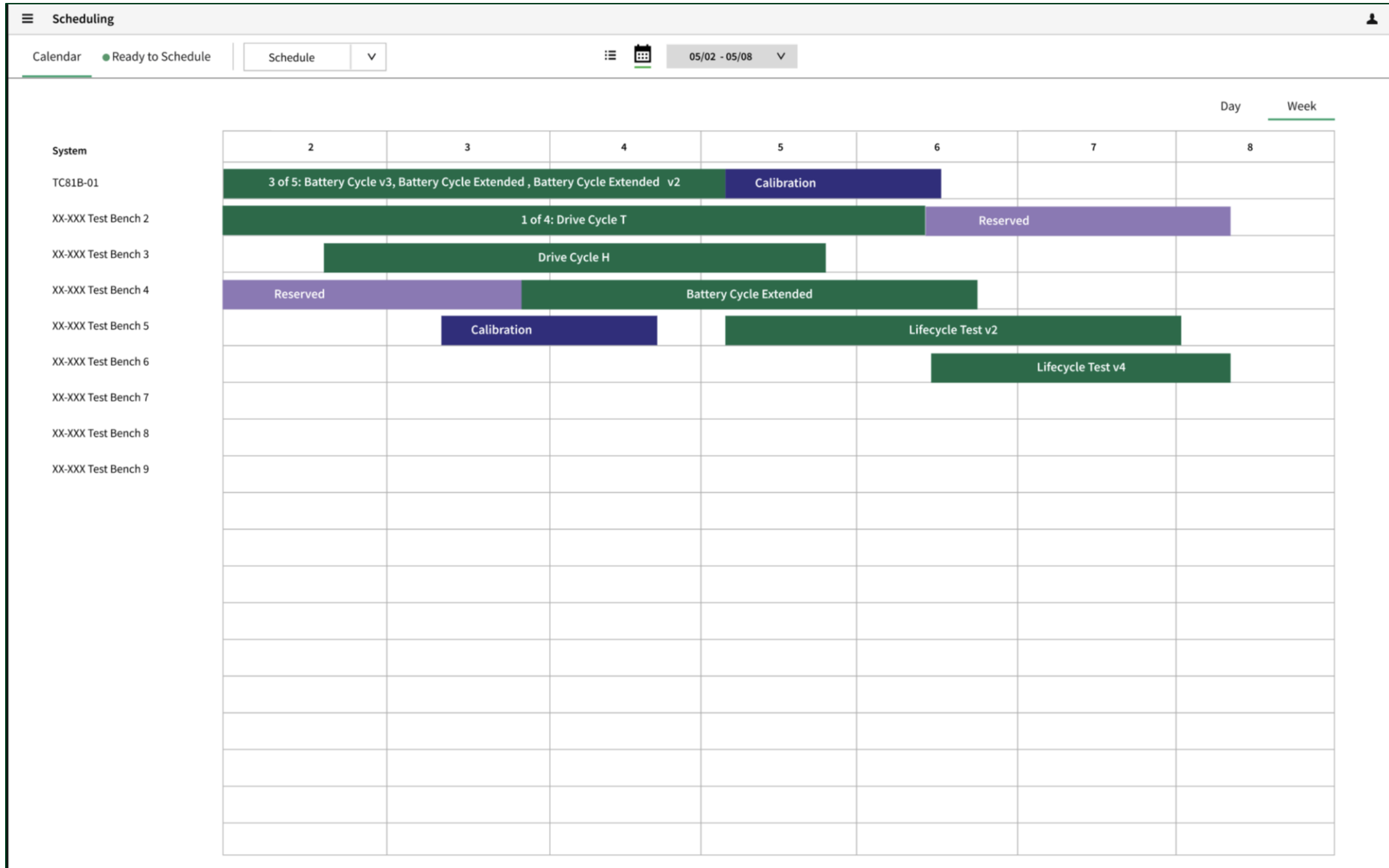
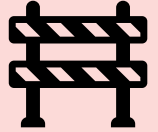
# Schedule lab equipment for tests or maintenance



Work Orders																	
5 Created by Me		5 Assigned to Me		15 All		15 New		15 Defined		15 Reviewed		15 Scheduled		15 Running		15 Pending Approval	
All				Test Requests		Calibration Requests		Maintenance Requests		Create work order		Default		Q		Filter	
<input type="checkbox"/>	Name	Status	Assigned To	Type	Earliest Start Date	Due Date	Start Date	Workspace	III								
<input type="checkbox"/>	Cycle Test G	Defined	Lin Y.	Test Request	--	12/12/22	--	LoF									
<input type="checkbox"/>	TC81B-07 maintenance	Defined	Bernhard W.	Maintenance Request	12/12/22	12/12/22	12/12/22	LoF									
<input type="checkbox"/>	TC01B-01 maintenance	Defined	Bernhard W.	Maintenance Request	12/12/22	12/12/22	12/12/22	LoF									
<input type="checkbox"/>	Cycle Test F	Defined	Lin Y.	Test Request	11/30/22	12/12/22	--	LoF									
<input type="checkbox"/>	Cycle Test E	Reviewed	Bernhard W.	Test Request	--	--	--	LoF									
<input type="checkbox"/>	Cycle Test E2	Reviewed	Bernhard W.	Test Request	12/13/22	12/12/22	--	LoF									
<input type="checkbox"/>	TC81B-01 calibration	Scheduled	Bernhard W.	Calibration Request	12/12/22	12/12/22	12/12/22	LoF									
<input type="checkbox"/>	Cycle Test E3	Reviewed	Bernhard W.	Test Request	--	12/12/22	--	LoF									
<input type="checkbox"/>	Cycle Test E4	Reviewed	Bernhard W.	Test Request	--	--	--	LoF									
<input type="checkbox"/>	TC02A-01 calibration	Scheduled	Bernhard W.	Calibration Request	12/12/22	12/12/22	12/12/22	LoF									
<input type="checkbox"/>	Cycle Test D	Scheduled	Lin Y.	Test Request	12/12/22	12/12/22	12/12/22	LoF									
	Cycle Test C	Scheduled	Lin Y.	Test Request	12/12/22	12/12/22	12/12/22	LoF									
	Cycle Test B	Scheduled	Bernhard W.	Test Request	12/12/22	12/12/22	12/12/22	LoF									
	Cycle Test B2	Scheduled	Bernhard W.	Test Request	12/12/22	12/12/22	12/12/22	LoF									
	Cycle Test A	In Progress	Bernhard W.	Test Request	12/12/22	12/12/22	12/12/22	LoF									
	<u>TC81B-06 maintenance</u>	Defined	Bernhard W.	Maintenance Request	12/12/22	12/12/22	12/12/22	LoF									
	<u>TC81B-06 calibration</u>	Defined	Bernhard W.	Calibration Request	12/12/22	12/12/22	12/12/22	LoF									

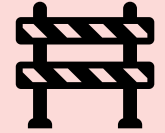


# Schedule lab equipment for tests or maintenance





# Collaborate with your team



☰ Work Orders / Battery Cycle v2 / Battery Test 1
👤

Name	Status	Assigned to	Earliest start	Due date
Battery Cycle Test 1	New ▾	Charlie S. ▾	11/03/2022	10/01/2023

Product	DUT serial number	Start date / time	Estimated duration	Last updated
BatteryPack_B Build	--	--	--	11/01/2022

Parameters
States
Files
History
Comments
+ Add comment

🔍
↶
↷
⋮

Please add in reports from Brian

- spec report -dec12
- test plan reference
- |

B
I
☰
☰
🔗
📄
“


Cancel
Comment

**Adison Robinson** 10/26/2022 3:30 PM CT ⋮

@**Charlie Salinas** Add in states for the following test plans

- battery test1
- battery test 2
- test plan xyz
- plan zbc

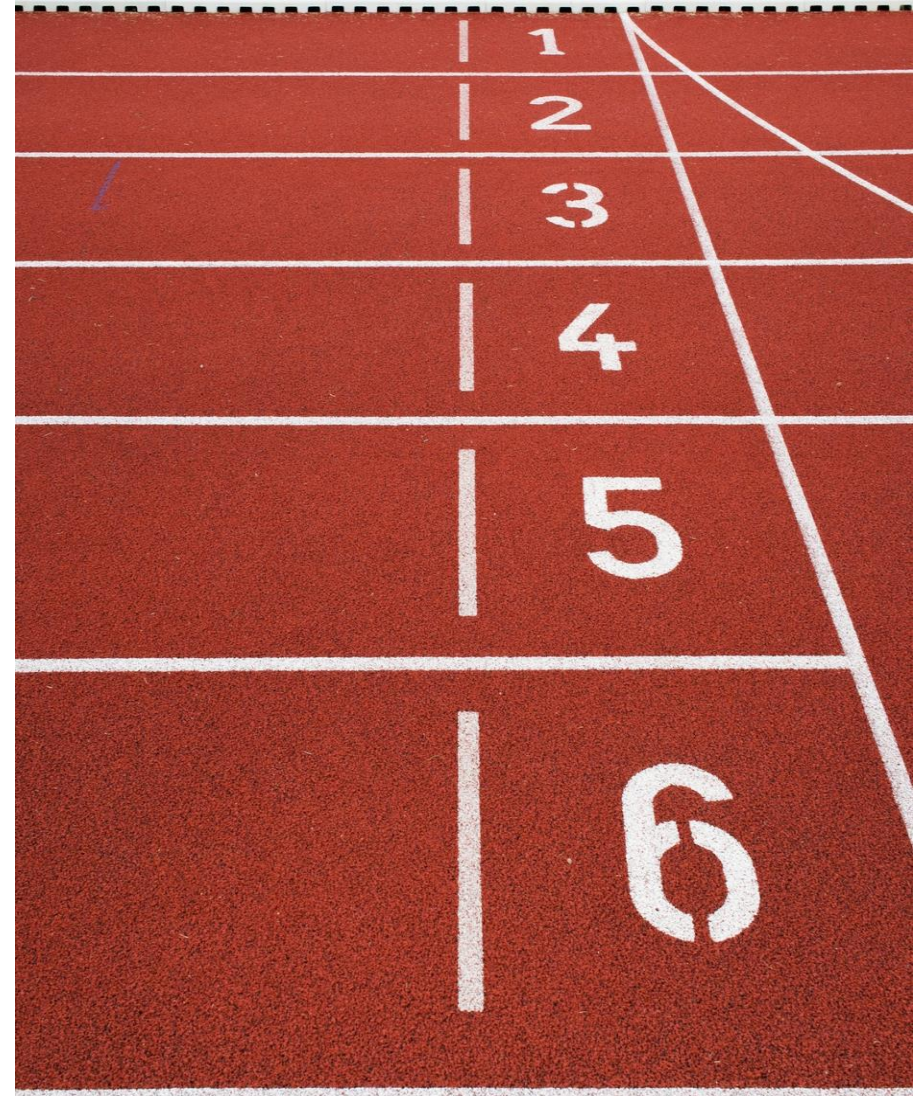
Set up tests with these test equipment:



**Charlie Salinas** 10/23/2022 3:30 PM CT

Scheduling all tests under Frank for now

Stay on top of your test backlog and track all your tests from request through completion with SystemLink work orders.



---

# Meet your IT needs

A decorative white curved line starts from the bottom left and arcs upwards and to the right, ending near the top right corner of the slide.



## Deployment options for your scale

### **Deployments:**

- On-Prem
- Private Cloud
- [NI Hosted Multi-tenant \(coming soon\)](#)

### **Environments:** Adaptable to customer solution

- Windows Server
- Kubernetes Cluster (Linux Containers)

### **Scalable:**

- From <50 to 1000+ systems and users
- < 1TB data or 1M results to 100TB+

# Summary

7 Ways SystemLink can  
Improve your Test Operations



1. Improves lab efficiency
2. Master your data
3. Keep your stakeholders up to date
4. Reduces the cost of test
5. Make Data Driven Decisions
6. Track your Test Lifecycle
7. Manage your IT needs

# Q & A



**Thank You**



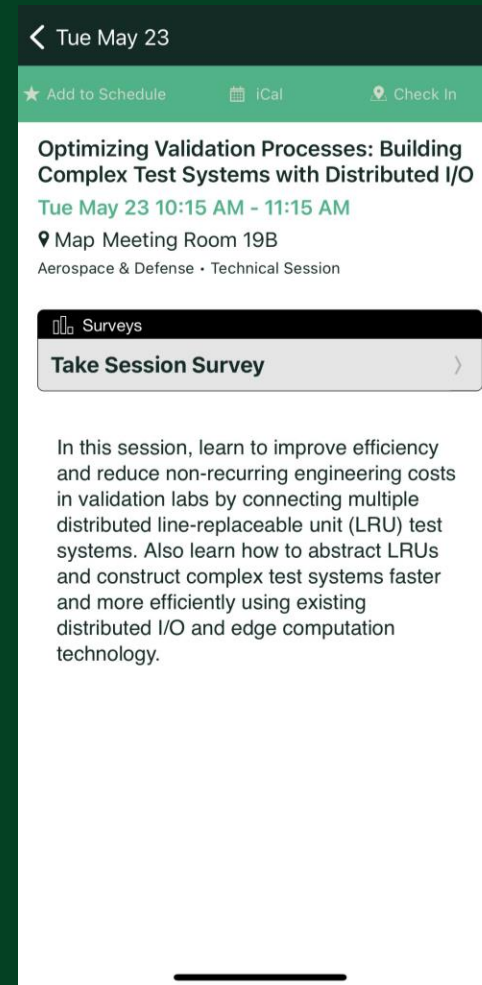
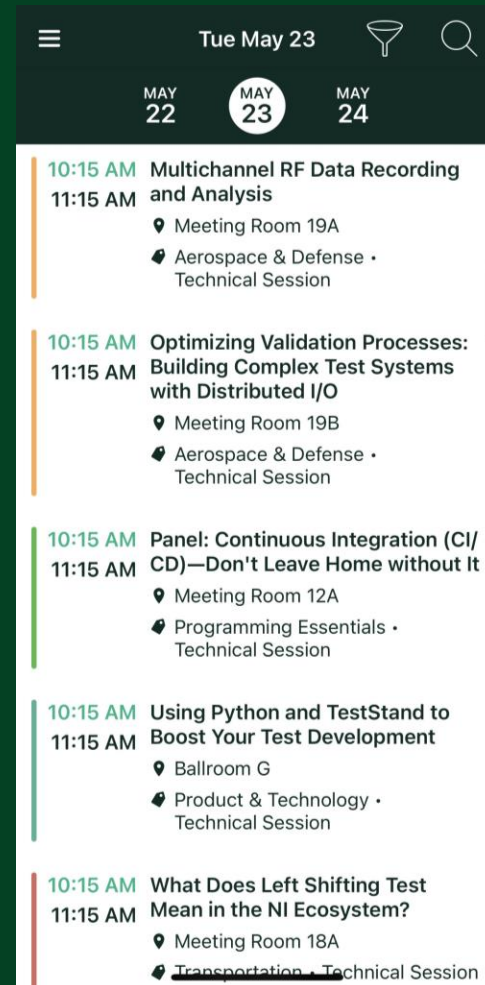
 **CONNECT**

**2023 AUSTIN**

# Give us your feedback!

## Quick 2 Question Survey

In the mobile app, click into the session you would like to provide feedback for



Click “Take the Session Survey”